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AUTHOR Jordan, William A.
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ABSTRACT

A study conducted at the Albuquerque Vocational-Technical Institute (New Mexico) investigated the need for occupation-related reading skills and resulted in recommendations for curriculum and instruction to meet those needs. The occupational areas examined include architectural drafting, office occupations, diesel mechanics, practical nursing, respiratory technicians, nurse assistants, electronics, instrumentation and control, and laser electro-optics. The study looked at the depth, function, and schema of reading skills needed and materials that must be read, and further examined the need for skills to integrate those three elements. It is recommended that occupation-related reading be an integral part of the curriculum and not only incidental or remedial, but also that such reading not be explicitly taught but be embedded in course content. (MSE)

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READING ON THE JOB: SCHEMA, FUNCTION, AND DEPTH

by

Dr. William A. Jordan

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Reading on the Job: Schema, Function, and Depth

Dr. William A. Jordan

Introduction

In examining job reading, emphasis has usually been placed on identifying the quantity of reading done in particular jobs (Diehl and Mikulecky, 1980), trying to determine the reading level needed for success in various jobs (Sticht et al., 1972), or using reading type analysis to examine reading in a particular trade (Chang, 1985). While these studies have yielded useful information about what may or may not be generalized about job reading, little work has been done to identify and explain reading problems within an occupation and to provide curricular and instructional information .

This study combined several different rhetorical perspectives with a cognitive hierarchy, Bloom's Taxonomy (1956) in examining reading on the job. Selinker and Trimble (1973, 1976, 1978) identified rhetorically determined grammar in technical writing (tense and article constraints among others) as well as rhetorical function-shifts e.g., within a passage overtly labelled description, a definition will occur which acts as a referent for the rest of the unit. Kaplan (1972) looked at patterns of the native language of foreign students and their writing form in English and determined that certain rhetorical patterns emerge from the interaction, i.e. students will write English sentences in a rhetorical form used in their native language.

The study was completed at the Albuquerque Technical-Vocational Institute and at Albuquerque area businesses. The areas examined included architectural drafting, office occupations, diesel mechanics, practical nursing, respiratory technicians, nurse assistants, electronics, instrumentation and control, and laser electro-optics.

Depth

Because type analysis and determination of time spent reading examine only the external situation of job reading, the Bloom Taxonomy was applied to job tasks to determine the depth of reading comprehension needed. For example, a mechanic may spend an hour a day looking up parts numbers for retrieval by the warehouse, but that is very low-level reading, needing only the basic comprehension of identifying the vehicle type, age and part particulars. However, when a mechanic is working on a vehicle and must remove a part to examine it for defects against the given specifications, he must use analysis, synthesis and evaluation, high level

cognitive functions. The specification of cognitive depth gives fuller meaning to comprehension in reading.

Function

Function has two related levels in this study. On the one hand, function operates at the rhetorical level in specifying the purpose of the overall passage, e.g., to describe a trouble-shooting procedure or to list conditions of a trust document or contract. On the other hand, it operates on the sentence level in specifying how those larger rhetorical forms are brought to the page; e.g., some ideas are more easily presented in complex sentences showing explicit subordination, while others come forth more easily in compound sentences showing coordinate position. Thus, function in technical reading determines that the overall purpose is consonant with the way the material is presented, or should be presented.

Schema

Broadly, schemas represent the overall pattern of a passage, including syntactic, semantic, and rhetorical levels. Just as a child learns schemas for fairy tales, including such aspects as a beginning, middle and end, good versus bad, and resolution of conflict, a technical reader must learn the pattern of a technical article including the forms, formats, and grammar. Generally, occupational areas which use discrete units for a given piece of reading are characterized by subordinate sentence structure and hierarchical organization. In contrast, occupational areas which use related units for a given piece of reading are characterized by coordinate sentence structure and cumulative organization.

Integration of Function and Schema

A good example of discrete, hierarchical organization with subordinate sentence structure is the typical diesel manual, though it could be almost any written unit dealing with mechanical repair or operation. The organization of the book, just as the organization of the sentence type, follows the pattern which appears to develop from the function which by nature is discrete, i.e., the only connection between the starter motor and the brakes is that they are mounted in the same vehicle and may be described in the same manual.

Diesel mechanics (and mechanics as a whole) is organized from the top down in a hierarchical classification and is characterized by subordinate sentence structure to support the "If...,then" type of thought development. The whole is made up of parts, but the parts, being discrete, only have relation through the whole. If one part were omitted, it would not necessarily change the other sections.

The manuals used in diesel mechanics have a very discrete organizational pattern. Just as the systems of a truck are discrete and not linked, so the parts of a manual are not linked. The isolation of each system from the others allows repair to proceed in a logical sequence, organized by a typical trouble-shooting procedure: "If the engine does not turn, go to page .... Check primary electrical system.", "If the engine turns, but does not start, go to page...check ignition system," "If the engine starts, then dies quickly, turn to page...check fuel system." Each sentence is subordinate, placing a condition on the reader that takes him to a separate part of the manual where the noted system will be further analysed in the same manner--rather than continuing the discussion within the same section or unit.

Furthermore, in diesel manuals, the pattern is hierarchically larger-to-smaller in each unit--whatever the unit size whether complete manual or sub-chapter. Manuals begin with an overall physical, functional, and operational description of the unit and proceed to subdivide, with each subunit following the same pattern of top-down, larger-to-smaller classification.

At the other extreme is the legal language encountered by people in Office Occupations (and peripherally in many other occupations as well) which is characterized by a horizontal rhetorical structure and coordinate sentence structure. Again, this grows out of the function. A legal document, a trust or contract for example, demands to be dealt with as a unified passage in which the various parts contribute to a whole. The invalidation of a single part can invalidate the whole.

In law, a definition must say what a thing is as well as what it is not, and there is as much litigation about what a thing is as about what it is not. The positive definition stands in coordinate relation to the negative definition, e.g., "The company will be responsible for ... and ... and ..., but it will not be responsible for ... and ... or ... unless...." To accomplish this need, the rhetorical form is organized horizontally (as in the lists of whereases in a contract where each is equal to the others), and the sentence structure uses coordination rather than subordination.

Expansion to Other Occupational Areas

Rarely is an occupation limited to just one type of structure. Just as several types of paragraph development, for example, cause and effect, and comparison and contrast, may occur simultaneously, so might types of organization and sentence structure overlap.

In the Health Occupations, one sees both types of reading. If a nurse reads a patient chart or history, the information must be cumulative, as it is following a

temporal sequence leading to the present. On the other hand, following protocols, or instructions for a mechanical device, will probably be characterized by discrete information.

In like manner, the electronics industry is characterized by maintenance on one side and research and development on the other. One of the characteristics of research and development work is the recording of all pertinent information: material, procedure, and result. Both positive and negative results are recorded because both are important, especially in light of any variations of material and procedure involved. This is necessary not only for the ability to replicate the experiment but also for establishing the date and procedure for patents and proprietary rights. Maintenance and repair troubleshooting, on the other hand, has a known linear sequence proceeding in a top-down fashion until the piece is serviced.

Reading in research and development (R&D) must be cumulative in nature as previous variations in material and procedure must be taken into account. Then, in recording results, note must be taken of what happened as an end product of the protocol followed. On the other hand, reading in troubleshooting is discrete, concerned only with the part under consideration; recording of information is limited to material fixed or replaced. Necessarily, reading in an R&D setting must be more involved than in troubleshooting as the researcher must be able to follow linear procedure as well as the troubleshooter, but must additionally be able to go beyond, dealing with results and at least a tentative discussion of why the results occurred.

Most occupations have at least a little cross-over of types, and many use both frequently. Diesel mechanics encounter legal style language in warranties and insurance work even as legal secretaries find discrete forms of reading in following office protocols.

Schema, Function and Depth

Where the integration of schema and function show the occupationally specific patterns of language, those patterns can be used more fruitfully to analyze texts by the addition of the element of depth. That is, does the text function purely as a reference? or must the information be internalized? If the former, does the reference reading demand low-level or high level cognition? If the latter, does the reader need to have a background in the subject in order to comprehend it? The specification of the structure of the text is only one part of analysing a job reading passage. The level of cognition needed for comprehension is quite another.

Recommendations for Instruction

Reading instruction should occur as an integral part of the curriculum and not, as in the present system, piecemeal remediation for those inadequately prepared for an occupation. The present system does not address the reality of the workplace adequately. Reading should not be taught explicitly as reading, but should be taught as another skill needed in the field. To a point, each occupation teaches reading already with instruction in charts, schematics, exploded views and diagrams; but just as these items are not taught in isolation, neither should be reading, because, at the most fundamental level, reading on the job means knowing how to get information. It means knowing how to access information whether in a reference manual, microfiche, or an on-line computer search and then how to integrate that knowledge to solve the problem at hand. With every occupation studied moving toward electronics and computer use, not only are job descriptions and the methods of doing those jobs changing, but also the types and methods of access of information for those jobs.

Having stated that explicit teaching of reading should be avoided, there are many ways in which reading instruction can be embedded into the course content for the benefit of the students and the ease of the teacher. With occupationally-specific problems at the lexical, syntactic, and rhetorical levels, the obvious place to teach reading is in the content classroom, and not as a separate class. Once reading is acknowledged as a job skill and not an academic frill by the vocational instructors, the teaching of reading can proceed under the guise of "how-to-access technical information."

The idea of gaining and using new information occurs on several levels, each of which can be approached by looking at the underlying rhetorical pattern previously presented. The teaching of the lexical, syntactic, rhetorical and informational levels within the context of the course content gives meaning to the pattern of organization rather than trying to add on "reading information" after course content has been taught.

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